

Another Form of Micrometer for Measuring Star Positions.

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When working with the beautiful Star-measurer designed by Sir David Gill, I noticed the accuracy of the work, and its convenience for the purpose ; but I was struck with the time taken to move the micrometer spider lines across a réseau square, and I came to the conclusion that it would be an improvement to have a quicker motion than the screw provided, without reducing the accuracy. I have also provided that microscopes should conveniently and rapidly read the positions in minutes, seconds, and tenths of seconds of arc, and the reader writes them down with a small type-writer, so that he need not take his eye from the microscopes, and can easily read and write them down in half a minute. So much is claimed ; let us see the mechanism.

Fig. I. (Plate 4).—Here the machine is in complete order for use ; A is a thin board to protect the graduated circles from the observer's breath, and the thin nickel-plated circles B and C were raised to give more room over the axes of the graduated circles.

Fig. II.—The thin board removed exposes the two graduated circles 5 inches in diameter : they are graduated only $\frac{1}{4}$ of the circumference. This space is divided into 5 minutes, and each minute is subdivided into 60 seconds—that is, into the space of a réseau on the photographic plates. Each microscope has a grating in the eyepiece which divides every second into 10 parts. When at work the lower parts of the observer's hands rest comfortably on B and C', and the fingers take H H, and turning them either way move the circles, and they are read by the microscopes F and G, and recorded by a small type-writer (not shown in the photograph), so that each observer is conveniently placed, and has comfortable positions for eyes and hands. (Of details later.)

Plate 6 shows the details of the small cast-iron chambers under the graduated circles. Starting from plan and section, J is the exact counterpart of an ordinary microscope with cross motions (except that it has no screws so far), but instead of screws at H H there are placed pieces of the balance-spring of a watch, H, by which, instead of screws, the micrometer is moved. (See X Y plan and section and elevation and section Z Z.) H is attached to C in each axis of the graduated circles by a screw I ; and the milled-headed screw J E and G, resting on the other wheels D D, is for regulating the friction

on that wheel ; without it the milled head is too free to feel pleasant when bisecting a star image carefully and accurately.

The adjustment of focus and of the scale—that is, the graduations on the circles—to be exactly equal to a réseau square, five millimetres, is provided for by the compound screws K K K K (*Fig. II.*), and the focal adjustment of the microscope.

The chambers shown in Plate 6 are $\frac{1}{4}$ -inch thick, are made of cast-iron, and are *dust proof*, thus keeping the changes of temperature very slow, and the effect as far as possible uniform over all the measuring parts.

Little need be said of the sliding frames for placing a réseau square in its place. There is a large hole as close to the micrometer J and as near that point as possible, so that a spot of the réseau plate under and about the microscope is easily seen for placing any part under the microscopes.

Fig. III. (Plate 5) shows the arrangement of the slides for adjusting the photograph ; one $\wedge$ guide controls the straight-line motion with perfect accuracy, the other support is on friction rollers, and the wire over the pulley carries a balance weight. The motion is all that can be desired ; the cross slide hangs on the upper edge of the larger slide, and works very satisfactorily.

Sydney Observatory : 1902 July 29.

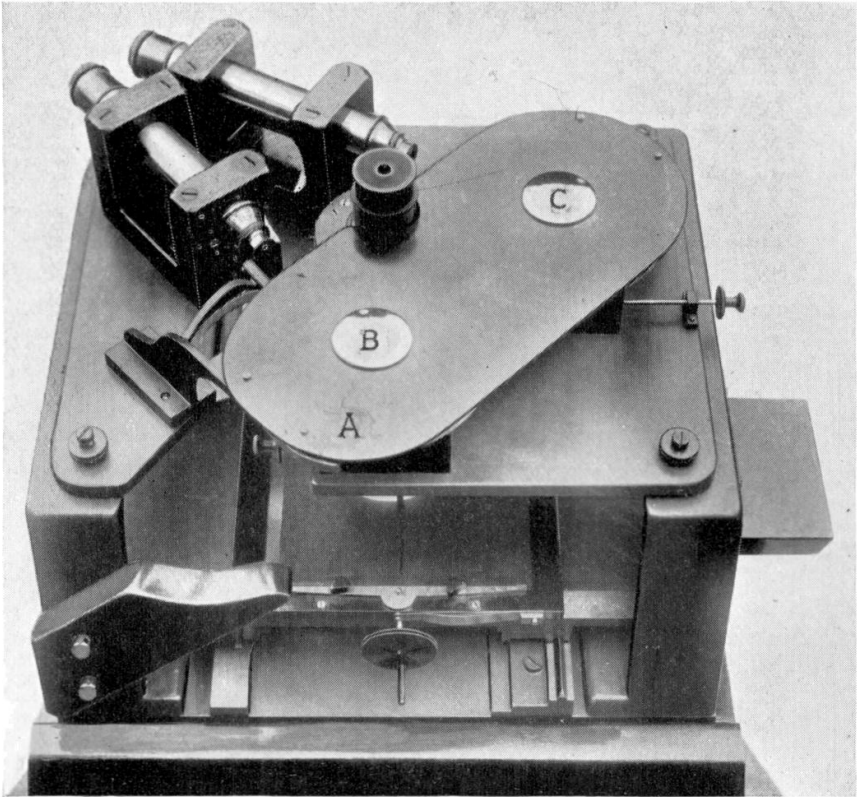
A Standard Scale for Telescopic Observations. By Percival Lowell.

(Communicated by the Secretaries.)

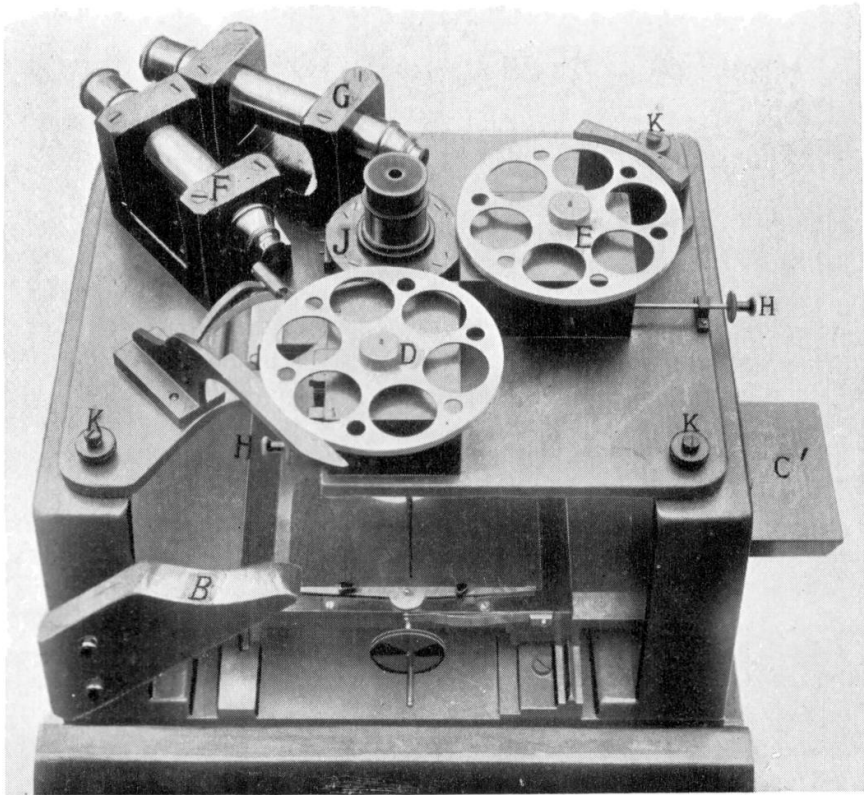
1. *Present State.*—At present there exists no criterion among astronomers for the weight to be attached to any given observation due to the atmospheric conditions under which it is made. Yet these atmospheric conditions are among the most important factors entering into an astronomic observation. They are far more to the point than the size of the instrument. For our telescopes have long since outstripped the conditions under which they are put to work ; the great bar to advance to-day, whether visually, photographically, or spectroscopically, being not instrument but atmosphere. Each man realises this, but marks his own work on his own scale, as if he should take his own foot as the unit of length.

2. *Difficulties of this Condition.*—In consequence no absolute value is assignable to any man's work, and no comparison between different men's work is possible whether in accuracy or credibility. The practical outcome is that the only test is the

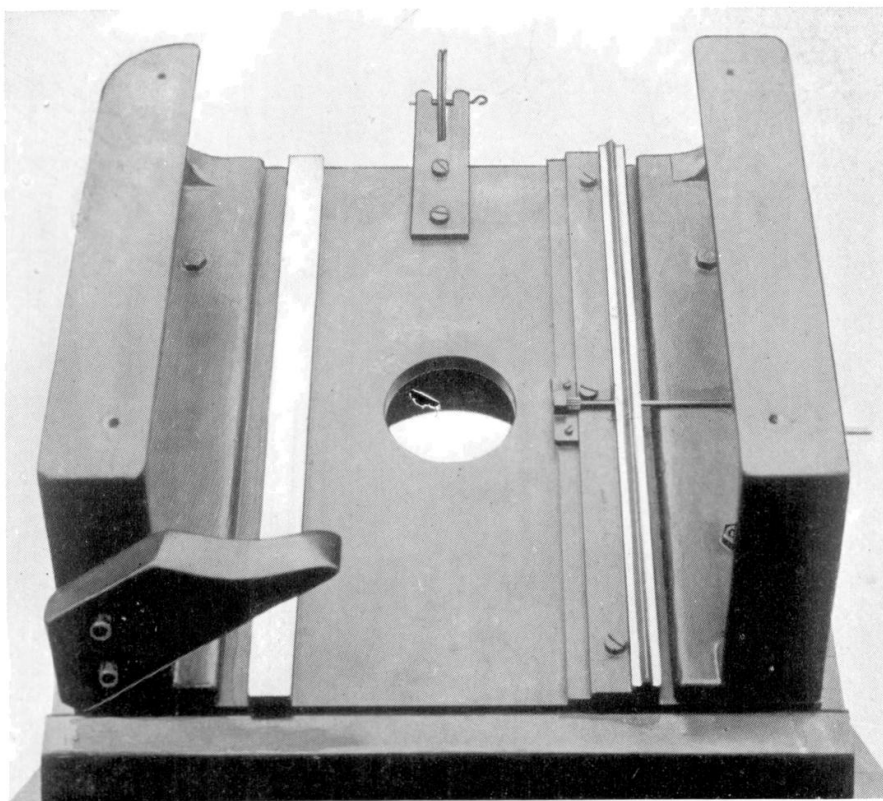
I.



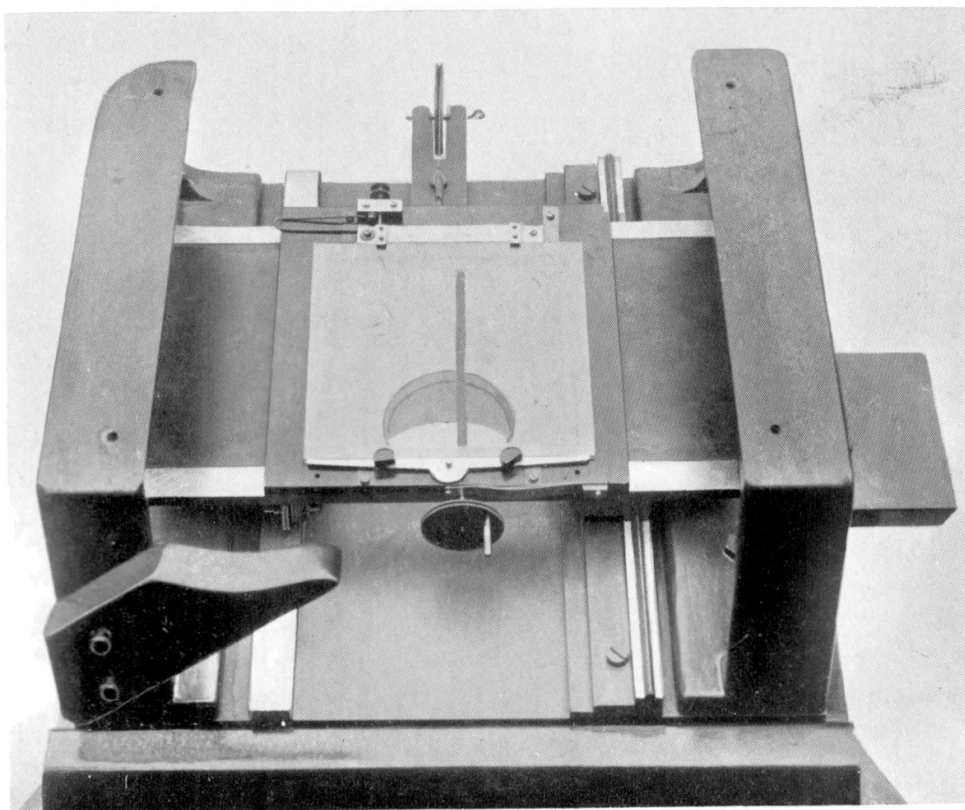
II.



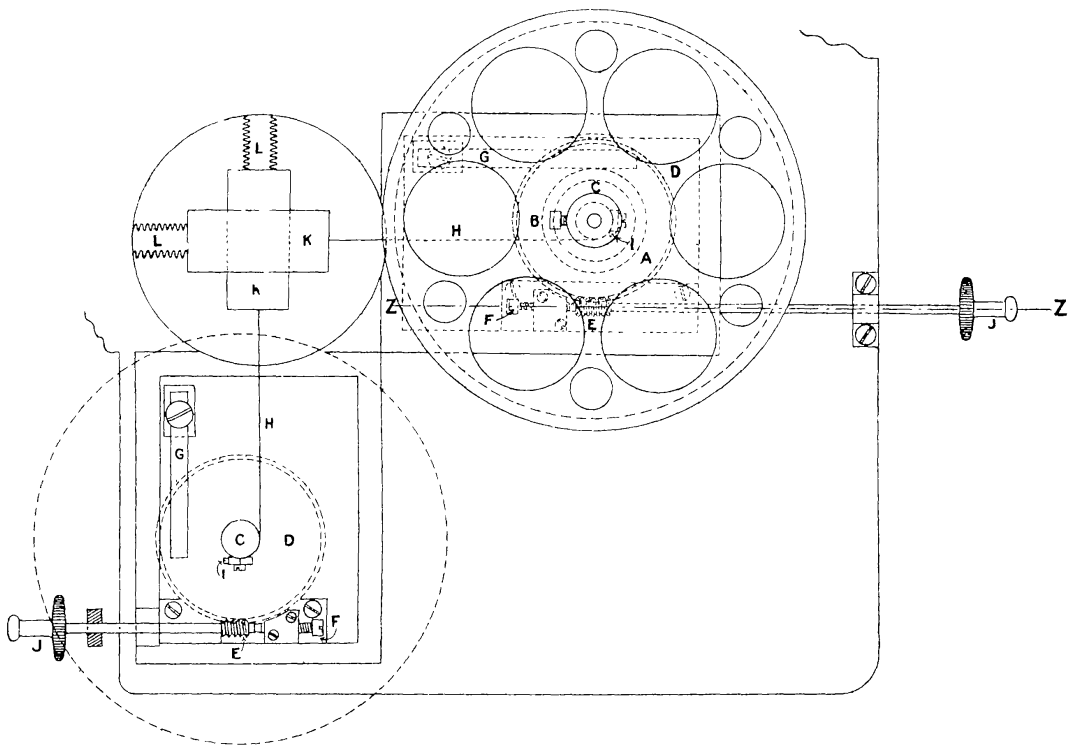
III.



IV.



PLAN AND SECTION ON XY



ELEVATION AND SECTION ON ZZ

